

Oribatid Mites of the Genus *Bipassalozetes* MIHELČIČ, 1957 (Acari: Oribatei; Passalozetidae) from Mongolia

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モンゴルから得られた

Bipassalozetes 属 (レンズダニ科) のササラダニ類

Abstract The present paper deals with the redescrptions of two known species and with description of four new species of oribatid mites of the genus *Bipassalozetes*, which were collected in Mongolia.

Introduction

The oribatid mite species of the genus *Bipassalozetes* are distributed mainly in the xeric habitats of the world. Most of the species are abundantly found in Europe (STRENZKE, 1953; MIHELČIČ, 1954, 1955, 1956, 1957, 1966; PÉREZ-IÑIGO, 1971, 1993; MAHUNKA, 1977; LUXTON, 1990 a, b), in Africa (WALLWORK, 1964; ENGELBRECHT, 1974; MAHUNKA, 1987), and sometimes in dry habitats of America and Middle Asia (HIGGINS & WOOLLEY, 1962, 1975; WALLWORK, 1972; WALLWORK *et al.*, 1984; SITNIKOVA, 1975). The family Passalozetidae had been represented by a single genus *Passalozetes* consisting of monodactyle, bidactyle and tridactyle species. MIHELČIČ (1957) separated the bidactyle species from the genus *Passalozetes* and established for them the genus *Bipassalozetes* and now eighteen species and two subspecies are classified to this genus.

Most important characters for the classification of species of this genus are structure of the cerotegumental microsculpture on the body surface, shape of sensilli, prodorsal ridges and dorsosejugal suture.

Only two species of the genus *Bipassalozetes* (*B. striatus* and *B. gobiensis*), have hitherto been known from Mongolia (MAHUNKA, 1964). In the course of ecological and taxonomical study of oribatid mite fauna of Mongolia we have found six species, of which one species, *B. bidactylus* (COGGI, 1900), is recorded for the first time from Mongolia and four species are new to science. Except only *B. bidactylus*, all the species are found in the arid lands of Mongolia. Abbreviations used in the text and the figure are shown below.

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A_1 - A_3 : areae porosae 1-3, Aa : anterior area porosa, ad_1 - ad_3 : adanal setae 1-3, apo . 1- apo .3: apodemata 1-3, $apo.sj$: sejugal apodemata, ex : exobothridial seta, gen_1 - gen_4 : genital setae 1-4, iad : adanal lyrifissure, im : middle lyrifissure, in : interlamellar seta, ms : middle notogastral seta, p_1 - p_3 : posterior notogastral setae, pd_1 - pd_3 : pedotacta 1-3, te - anterolateral notogastral seta

***Bipassalozetes bidactylus* (COGGI)**

(Figs. 1-4)

Scutovertex bidactylus COGGI, 1900, p. 315, fig. 3; WILLMANN, 1931, p. 143, figs. 181,182; VAN DER HAMMEN, 1952, p. 68.

Passalozetes bidactylus: STRENZKE, 1953, p. 231, pl. 18; SELLNICK, 1960, p. 92; HIGGINS & WOOLLEY 1962, p. 95, fig. 12; PÉREZ-IÑIGO, 1971, p. 337, figs. 74, 75.

Bipassalozetes bidactylus: PÉREZ-IÑIGO, 1993, p. 57, figs. 19A-C. *Passalozetes vicinus*: MIHELČIČ, 1957, p. 25, fig. 1.

Colour. Deep reddish brown.

Measurement. Body length 356 (373) 381 μ m, width 186 (203) 211 μ m, showing minimum (average) maximum length and width.

Microsculpture of cerotegument. The whole surface of the cerotegument is ornamented with irregularly interrupted, brown reticulation consisting of star-shaped structures interspersed with minute sphaerical tubercles of varying size. In the anterior part of prodorsum and in the lateral parts close to pedotacta pd_1 the ornamental structures becoming more linear and almost parallel to one another. The microsculpture of ventral side almost same as in dorsal side.

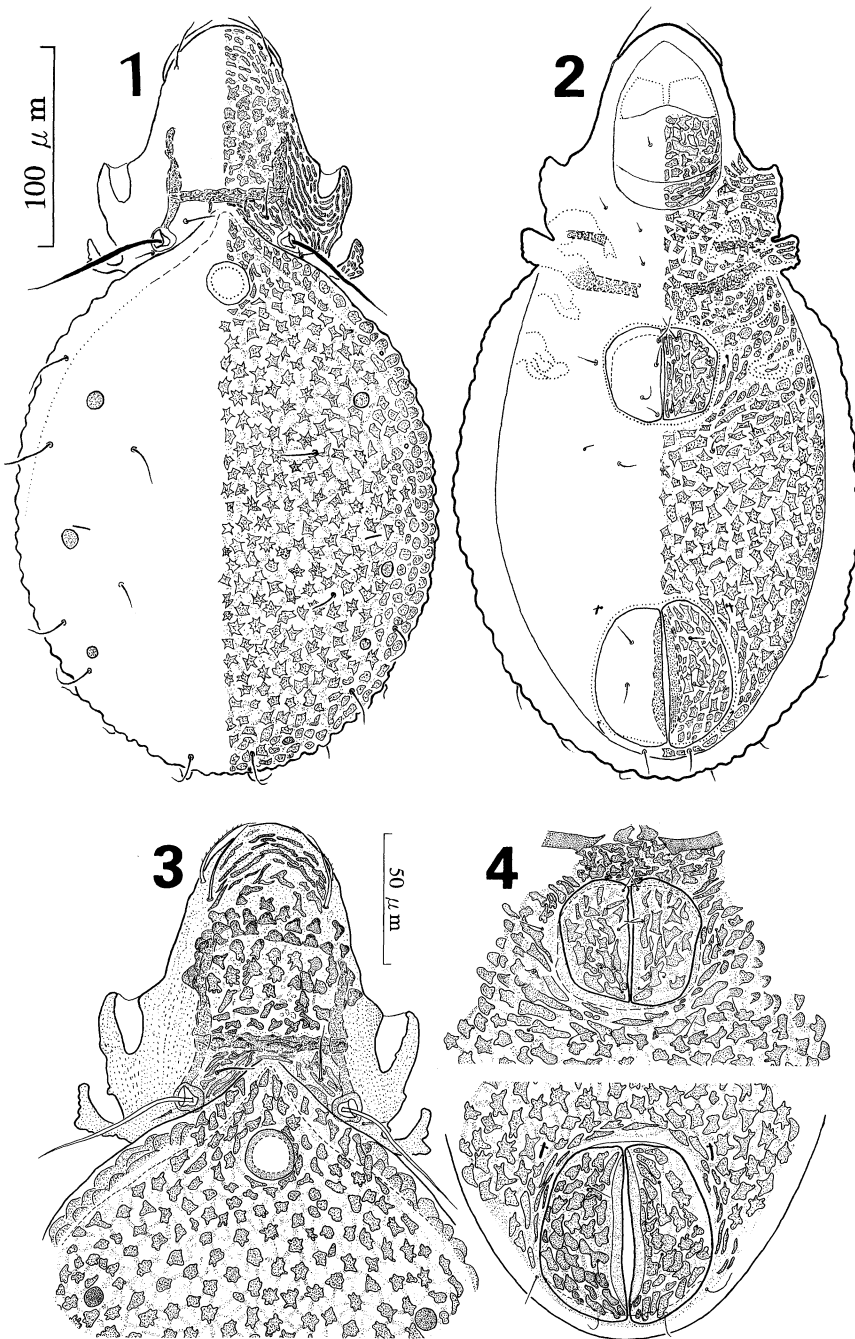
Prodorsum. Rostrum broadly rounded; rostral and lamellar setae moderately long, slender and almost of similar size. Rostral setae finely barbed unilaterally; lamellar setae smooth, inserted anteromediad of rostral one. Interlamellar setae about half as long as lamellar setae, slender, inserted median to bothridia; exobothridial setae small, glabrous, inserted close to bothridia; sensillus setiform, tapering to a pointed tip. A pair of thickened prodorsal ridges extending from the bothridia to the middle level of prodorsum, being connected by a thick transverse ridge in front of interlamellar setae.

Notogaster. Shape of notogaster oval, slightly tapering anteriorly, about 1.3 x as long as wide. Dorsosejugal suture sharply projecting and interrupted medially at the top of the projection. Lenticulus clear, round, surrounded by irregular structure of cerotegument. Ten pairs of notogastral setae fine and slender; three pairs of rather large areae porosae present; A_2 somewhat smaller than Aa and A_1 . Lyrifissure im distinct, situated anteromedially to area porosa A_1 .

Ventral side. Sejugal apodema well developed on coxisternal region, but not extending to the midline; apo .2 shorter than sejugal, narrow antiaxially, becoming broader paraxially. Epimeral setae fine, some of them inconspicuous, only identified by their insertions; setal formula 2:1:1:2. Four pairs of genital, two pairs of aggenital, two pairs of anal and three pairs of adanal setae present; ad_3 situated close and just medially to adanal lyrifissures, preanally at a short distance from anal plates.

Legs. All tarsi heterobidactylous, with one strong claw and the other long, more weakly developed claw.

Material examined. Three specimens: Central Province, District Altanbulag,



Figs. 1-4. *Bipassalozetes bidactylus* (COGGI, 1900) — 1. Dorsal side. 2: Ventral side.
3: Prodorsum. 4: Anogenital region.

natural park "Khustai", mountain steppe (*Stipa grandis*), 19-IV-1996., K. ULYKPAN (No. 1-20-2; 3-7-2).

Remarks. The Mongolian specimens are mostly well in accord with the description of the European specimens. Only differences are found in the number of aggenital setae (two pairs in the Mongolian, one pair in the European specimens) and the position of area porosa *Aa* (remote from seta *te* in the Mongolian, close to seta *te* in the European specimens).

***Bipassalozetes gobiensis* (MAHUNKA)**
(Figs. 5-8)

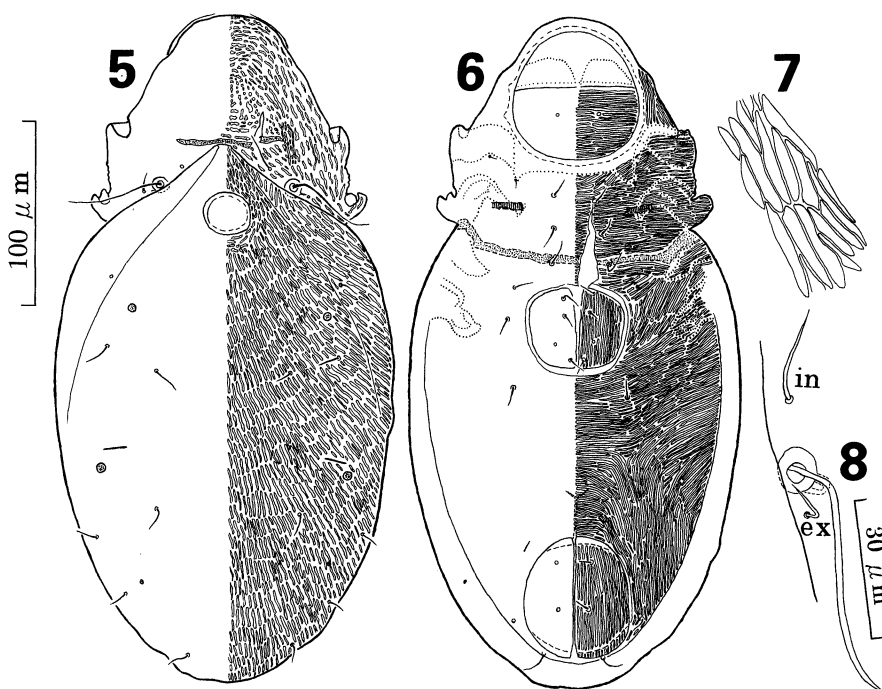
Passalozetes gobiensis MAHUNKA, 1964, p. 484, fig. 3.

Bipassalozetes gobiensis: PÉREZ-IÑIGO, 1993, p. 63.

Colour. Yellow.

Measurement. Body length 356-372 μm ; width 170-186 μm .

Microsculpture of cerotegument. Microsculpture of cerotegument on dorsal side consists of fine, dense, obliquely decurrent, irregularly interrupted linear structure. Microsculpture of ventral side almost similar to that of dorsal side, weakly pigmented, but linear structures are slightly narrower and longer than dorsal ones.



Figs. 5-8. *Bipassalozetes gobiensis* (MAHUNKA, 1964). — 5: Dorsal side. 6: Ventral side. 7: Surface structure of notogaster. 8: Sensillus.

Prodorsum. Rostrum broadly rounded, rostral setae very fine and glabrous; lamellar setae undetectable, probably extremely minute. Interlamellar setae moderately long, slender; exobothridial setae short, nearly half as long as interlamellar setae; both pairs glabrous. Sensillus long, setiform, tapering to a pointed apex. A broad transversal ridge found close to and in front of dorsosejugal suture, almost equal in length to mutual distance between bothridia.

Notogaster. Shape of notogaster oval, long, slightly tapering posteriorly, about 1.6 x as long as wide. Dorsosejugal suture sharply projecting, continuous. Lenticulus distinct, circular and not obscured by cerotegumental microsculpture; all notogastral setae very fine and slender, difficult to observe, a total seven pairs being noted, setae p_1 , p_2 and p_3 probably extremely minute. Three pairs of areae porosae present, Aa and A_1 rather large, A_2 distinctly smaller than Aa and A_1 . Lyrifissure *im* distinct, situated anteromedially to area porosa A_1 .

Ventral side. Sejugal apodema *apo.sj* well developed; *apo.2* present, shorter than the sejugal one. Epimeral setal formula 3:1:2:1; all epimeral setae fine and glabrous. Four pairs of genital setae inserted medially on genital plates, except for g_2 ; one pair of aggenital, two pairs of anal and two pairs of adanal setae present, ad_3 probably absent. Adanal lyrifissures *iad* located near the anterior corner of anal aperture, slightly removed from margins of anal aperture.

Legs. All tarsi bidactylous, one of claws thinner and longer than the other.

Material examined. Three specimens: Gobisumber Province, Sumber District, desert steppe, 21-IX-1991., B. BAYARTOGTOKH. (No. 1-2-2; 506-20-1),

Remarks. The present material is closely similar to the material of *B. gobiensis* (MAHUNKA, 1964), described from the east-southern part of Mongolia. However, the character of our specimen is not so well in accord with the original description and the figures in (1) posteriorly tapering shape of notogaster, (2) situation of notogastral setae $p_1 \sim p_3$.

Bipassalozetes microsculptratus sp. nov.

(Figs. 9-12)

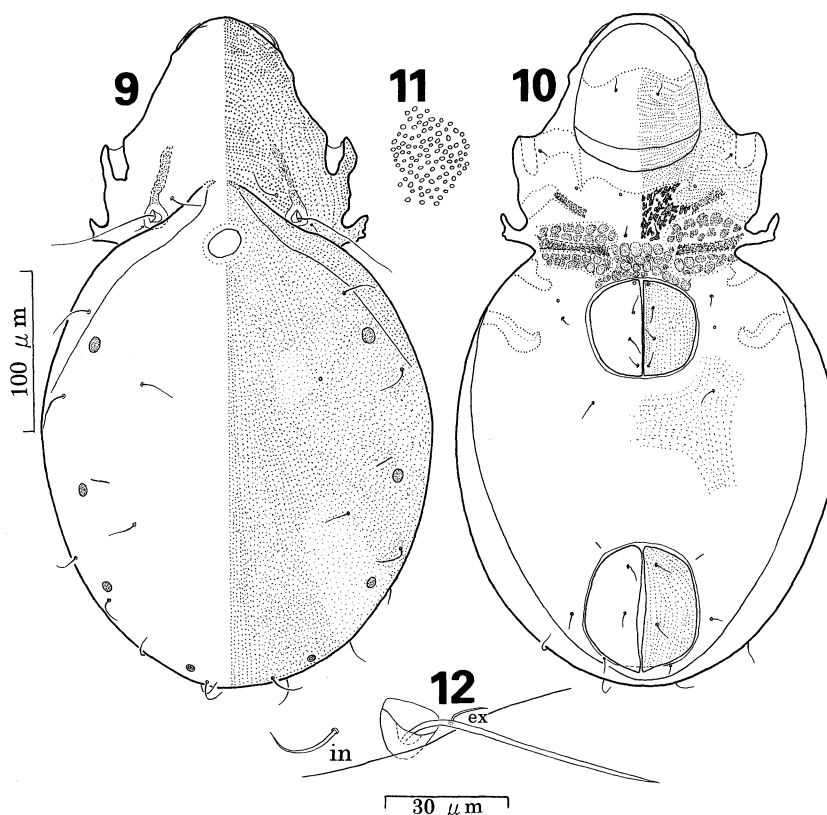
Colour. Dark yellowish to light brown.

Measurement. Body length 428 (437) 448 μm ; width 232 (238) 244 μm .

Microsculpture of cerotegument. Microsculpture of cerotegument on dorsal side consists of very small irregularly spaced dot like granules. The granules on notogaster indistinct, because they are weakly pigmented and minute. Surface of ventral side similarly sculptured as on notogaster, except on epimeral region with more distinct and heavily pigmented sculpture.

Prodorsum. Prodorsum slightly wider than long; rostrum blunt, broadly rounded; rostral and lamellar setae short, in similar size, slender and glabrous. Interlamellar setae inserted anteromedian to bothridia. Bothridium directed anterolaterad, lateral to which is the insertion of the short exobothridial seta. Sensillus setiform, very slender and glabrous, tapering to a pointed apex; a pair of thickened ridges present, extending from the bothridia to the level of pedotecta pd_1 .

Notogaster. Shape of notogaster oval, slightly tapering anteriorly; dorsosejugal suture interrupted at the top of middle projection. Lenticulus clear, round; nine pairs



Figs. 9-12. *Bipassalozetes microsculptratus* sp. nov. — 9: Dorsal side. 10: Ventral side. 11: Surface structure of notogaster. 12: Sensillus.

of notogastral setae fine and slender; four pairs of distinct areae porosae as well as the rather long lyrifissures *im* seen in dorsal view.

Ventral side. The sejugal apodema well developed on the coxisternal region, but not extending to the midline; apodema *apo.2* shorter than *apo.sj*; *apo.3* indistinct. Epimeral setal formula 3:1:2:1; all epimeral setae fine and minute. Genital plates with four pairs of setae; one pair of aggenital setae inserted about twice their lengths, posterolaterad of genital aperture. Anal aperture nearly one-third larger than genital aperture, with two pairs of setae. Two pairs of adanal setae present; adanal lyrifissures *iad* located anterolateral to anal aperture.

Legs. All tarsi bidactylous, with one strong and the other long, more weakly developed claws.

Type series. Holotype and one paratype: Central Province, District Bayanunjuul, mountain "Zorgol Khairkhan", mountain steppe, 10-IX-1991, (No. 2-3-1); two paratypes, Gobisumber Province, Sumber District, desert steppe, 27-VII-1993, (No. 501-7-2; 5-13-9; 2-3-1); two paratypes Middle gobi Province, Gobi-Ugtaal District, mountain "Ikh Gazryn Chuluu", desert steppe, 15-IX-1991, (No. 1-1-1; 1-4-1), B.

BAYARTOGTOKH. The holotype and three paratypes are preserved in the Acaralogy collection of the Department of Zoology, National University of Mongolia, and two paratypes are deposited in the National Science Museum, Tokyo, Japan.

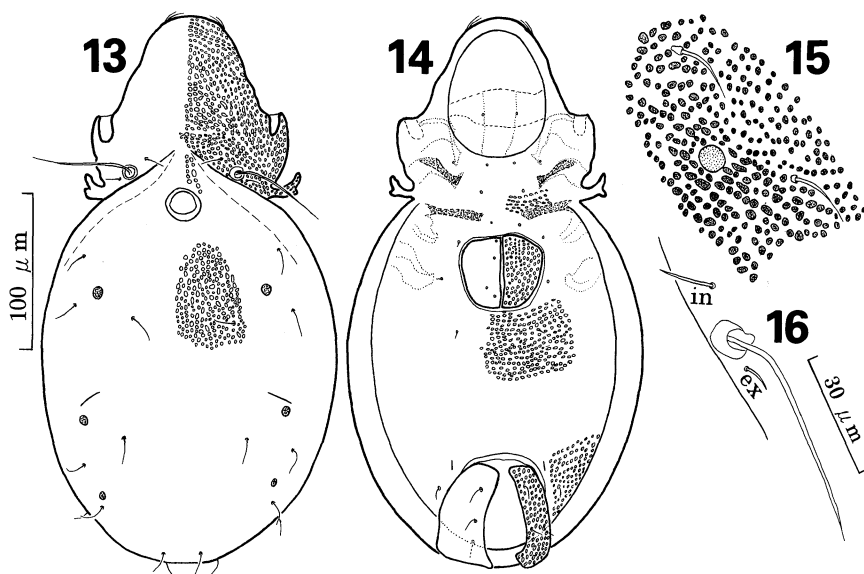
Remarks. Among the known *Bipassalozetes* species so far, the new species resembles *B. striatus* (MIHELČIČ, 1955), *B. granulatus* (MIHELČIČ, 1955) and *B. propinquus* (MIHELČIČ, 1956) in some respects. However the new species is distinguished from the above three species by the structure of cerotegumental microsculpture of the ventral and dorsal sides. *Bipassalozetes microsculptratus* sp. nov. is distinguished from the Mongolian *B. striatus* (= *P. kaszabi* MAHUNKA, 1964), in the slightly tapering shape of the posterior part of notogaster, the number of genital and anal setae (5:3 setae respectively in MAHUNKA's specimen), presense of thickened ridges on the prodorsum and relatively short and weakly developed posterior notogastral setae. The new species differs from the European *B. striatus* (MIHELČIČ, 1955; PÉREZ-IÑIGO, 1971) by (1) glabrous sensillus, (2) more round shape of notogaster and (3) the arrangement of prodorsal ridges. The new species distinguished from *B. propinquus* and *B. granulatus* in the (1) more wide and round shape of notogaster, (2) position of rostral and lamellar setae, (3) the arrangement of prodorsal ridges and (4) the number of areae porosae.

***Bipassalozetes mahunkai* sp. nov.**

(Figs. 13-16)

Colour. Yellow.

Measurement. Body length 337 (344) 348 μm ; width 185 (186) 187 μm .



Figs. 13-16. *Bipassalozetes mahunkai* sp. nov. — 13: Dorsal side. 14: Ventral side. 15: Surface structure of notogaster. 16: Sensillus.

Microsculpture of cerotegument. Microsculpture of the dorsal and ventral sides very similar to each other, consisting of irregularly spaced dark granules. More anteriorly close to the anterior margin of prodorsum the granules becoming smaller and being arranged in lines, almost parallel to one another.

Prodorsum. Prodorsum slightly wider than long; rostrum rounded; rostral and lamellar setae short, slender, inserted near tip of rostrum, curved medially toward tip of rostrum. Interlamellar setae short, slender, inserted median to bothridia. Exobothridial setae short, thin, inserted close and lateral to bothridia. Sensillus setiform, sharply pointed at tip.

Notogaster. Notogaster oval, anterior margin extended forward, coalesced medially with dorsum of propodosoma beyond level of interlamellar setae; dorsosejugal suture interrupted at this middle projection. Lenticulus clear, round; nine pairs of notogastral setae fine and slender; three pairs of rather large areae porosae present; *Aa* somewhat larger than remaining areae porosae; lyrifissure *im* long, situated anteriorly to area porosa *A*₁.

Ventral side. Apodemata *apo.sj* and *apo.2* well developed on the coxisternal region, each pair widely separated medially from each other; *apo.3* and *apo.4* indistinct. Epimeral setal formula 2:1:2:1; all epimeral setae minute and inconspicuous, difficult to find in the cerotegument; visible setae and their insertions as shown in figure 14. Genital aperture with four pairs of simple setae; one pair of aggenital setae inserted about twice their lengths posterolaterad of genital aperture; anal aperture nearly one-third larger than genital's, situated in the posterior end of ventral plate, each plates with two setae; adanal setae difficult to find in the cerotegument, visible setae are *ad*₁ and *ad*₂. Adanal lyrifissure *iad* small, located anterolaterally to anal aperture, aligned almost parallel to long axis of body.

Legs. All tarsi bidactylous, with one strong thick and the other long and weakly developed claws.

Type series. Holotype and three paratypes: Central Province, District Bayantsagaan, 55 km north from the center of district (47° 30' N and 106° 20' E). Grassland steppe (*Stipa baicalensis* + *Termopsis lanceolatum*), altitude 1300 m. 23-IX-1991., B. BAYARTOGTOKH (No. 1-1-2; 1-2-2). The holotype and one paratype are preserved in the Acarology collection of the Department of Zoology, National University of Mongolia, and two paratypes are deposited in the National Science Museum, Tokyo, Japan.

Remarks. *Bipassalozetes mahunkai* sp. nov. resembles *B. granulatus* (MIHELČIČ, 1956) from Spain and *B. perforatus* (BERLESE, 1910) from Europe in having granular sculpture on notogaster, but it is distinguishable from the latters by the surface sculptures of prodorsum and ventral plate which show granular pattern as on notogaster. Name of the new species is dedicated to Dr. S. MAHUNKA, Hungarian Natural History Museum, who described the first oribatid mite species of Mongolia.

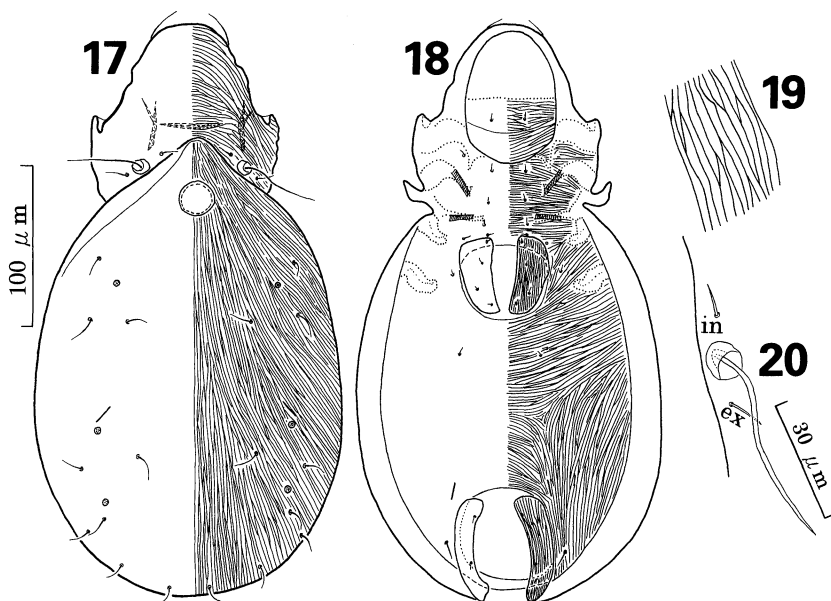
***Bipassalozetes deserticus* sp. nov.**

(Figs. 17-20)

Colour. Light yellow.

Measurement. Body length 368 µm; width 194 µm.

Microsculpture of cerotegument. Microsculpture of cerotegument on dorsal side



Figs. 17-20. *Bipassalozetes deserticus* sp. nov. — 17: Dorsal side. 18: Ventral side. 19: Surface structure of notogaster. 20: Sensillus.

consisting of very fine lines, which are very similar to the pattern of a human fingerprint. On the ventral side the pattern similar as on notogaster and distinctly visible. The microsculpture of cerotegument both of dorsal and ventral sides very weakly pigmented.

Prodorsum. Rostrum broadly rounded; rostral setae rather long and fine; lamellar setae very minute and hardly to distinct; interlamellar setae short, slender, inserted median to bothridia; exobothridial setae rather long. Sensillus setiform, with a curved basal portion, tapering into a sharply pointed tip. A pair of narrow ridges present, extending from bothridia to the level of pd_1 , connected by a transverse ridge.

Notogaster. Shape of notogaster oval, slightly tapering anteriorly, about 1.5 x as long as wide. Dorsosejugal suture sharply projecting and continuous. Lenticulus clear, circular, surrounded by linear pattern; nine pairs of notogastral setae present, all setae fine and slender. Three pairs of small, rounded areae porosae Aa , A_1 , and A_2 seen in dorsal view, and also the fairly long lyrifissure *im* found.

Ventral side. Apodemata *apo.sj* and *apo.2* well developed on the coxisternal region, but each pair of them widely separated medially; epimeral setal formula 3:1:2:2. Four pairs of genital setae inserted medially on genital plates; one pair of aggenital, two pairs of anal and two pairs of adanal setae present, *ad3* absent; all ventral setae thin, minute and glabrous. Adanal lyrifissure *iad* rather long, located anterolaterally to anal aperture, slightly removed from margins of anal plates.

Legs. All tarsi bidactylous, with one strong claw and the other more weakly developed and longer claw located paraxial to the former.

Type series. Holotype, only 1 specimen: Bayankhongor Province, District Shine-jinst, Trans-Altai Gobi-desert, extremely arid desert, under *Haloxylon ammodendron*,

16-VII-1991., B. BAYARTOGTOKH (No. 91-2-1). The holotype is preserved in the Acaralogy collection of the Department of Zoology, National University of Mongolia

Remarks. The new species resembles *B. linearis* (HIGGINS & WOOLLEY, 1962), notably in the form of cerotegumental microsculpture and the body size. However, *B. deserticus* sp. nov. differs from *B. linearis* in the (1) shape of sensillus (expanded distally and densely setose on head in *B. linearis*; setiform and narrow pointed at tip in *B. deserticus* sp. nov.), (2) the position and the number of notogastral setae, (3) presense of the distinctly visible three pairs of areae porosae, (4) pronounced prodorsal ridges, (5) continuous dorsosejugal suture and (6) the number of adanal setae. Moreover the new species shows some resemblance to *B. lineolatus* (SITNIKOVA, 1975), in the pattern of cerotegumental microsculpture. However, the new species is easily separated from *B. lineolatus* in the (1) shape of notogaster, (2) the number of notogastral setae, (3) shape of dorsosejugal suture and (4) far small body size.

***Bipassalozetes mongolicus* sp. nov.**

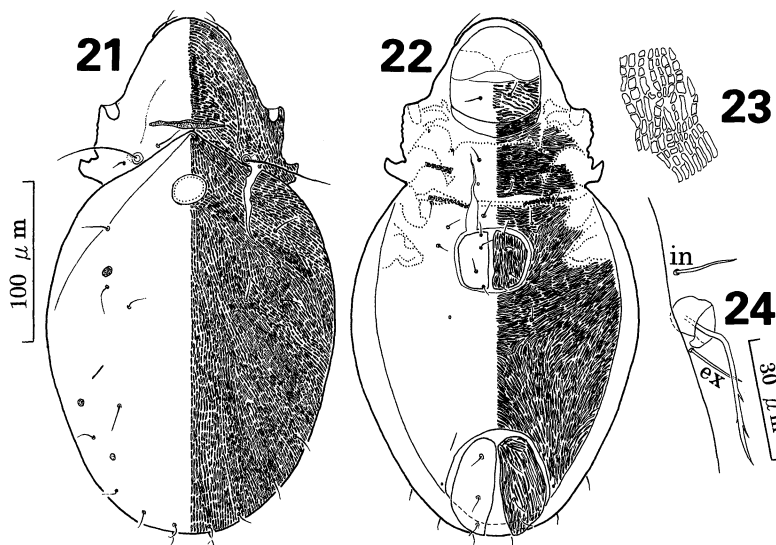
(Figs. 21-24)

Colour. Light-brown.

Measurement. Body length 307 (329) 348 μm ; width 158 (167) 182 μm .

Microsculpture of cerotegument. The whole surface of cerotegument densely ornamented with small irregularly broken, dark ridges. On the ventral side the ridges more continuous, especially on epimeral region and behind genital and anal apertures.

Prodorsum. Rostrum rounded; rostral and lamellar setae nearly equal in length, latter inserted anteromedial of rostral one. Interlamellar seta a little shorter than



Figs. 21-24. *Bipassalozetes mongolicus* sp. nov. — 21: Dorsal side. 22: Ventral side.

23: Surface structure of notogaster. 24: Sensillus.

lamellar one, inserted anteromediad of bothridium; exobothridial setae small; all prodorsal setae thin, slender and glabrous. Sensillus long, very thin and weakly barbed. A stronger transversal ridge and very narrow longitudinal ridges found on prodorsum.

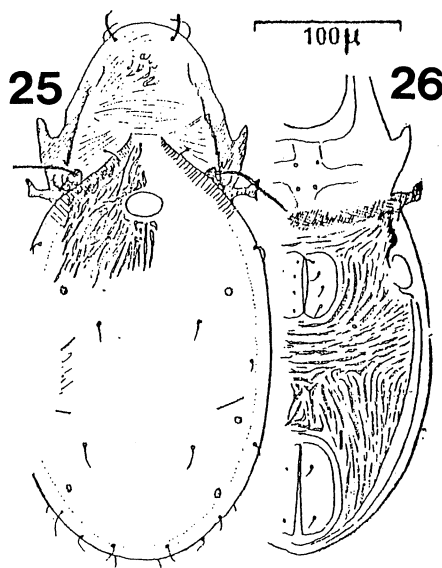
Notogaster. Shape of notogaster oval, slightly tapering posteriorly, about 1.4 x as long as wide. Dorsosejugal suture sharply projecting but not interrupted. Lenticulus distinct, round; a total nine pairs of notogastral setae noted. Three pairs of small, rounded areae porosae Aa , A_1 and A_2 seen in dorsal view, and rather long lyrifissure *im* found.

Ventral side. The sejugal apodema well developed, *apo.2* shorter than sejugals. Epimeral setae fine, minute, glabrous; setal formula: 2:1:2:2. Genital aperture with four pairs of setae; one pair of aggenital setae inserted about twice their lengths posterolaterad of genital aperture. Anal aperture nearly one-third larger than genital one, with two pairs of setae; adanal setae *ad1* and *ad2* present. Adanal lyrifissure *iad* located anterolaterally to anal aperture.

Legs. All tarsi bidactylous; one claw strong and the other long, more weakly developed.

Type series. Holotype and five paratypes: Central province, District Bayantsagaan, 55 km north from the center of district (47° 30' N and 106° 20' E). Grassland steppe (*Stipa baicalensis* + *Termopsis lanceolatum*), altitude 1300 m. 23-IX-1991. (No. 2-3-2; 2-4-2; 2-8-2), B. BAYARTOGTOKH. The holotype and three paratypes are preserved in the Acarology collection of the Department of Zoology, National University of Mongolia, and two paratypes are deposited in the National Science Museum, Tokyo, Japan.

Remarks. The present new species resembles *B. gobiensis* (MAHUNKA, 1964) and *B. reticulatus* (MIHELČIČ, 1959). It differs, however, from *B. gobiensis* in the relatively short and wide notogaster, small size and shape of cerotegumental ridges. It can be



Figs. 25, 26. *Bipassalozetes striatus* (MIHELČIČ, 1955) — 25: Dorsal side. 26: Ventral side. (after PÉREZ-IÑIGO, 1971).

differentiated from *B. reticulatus* by the small size of body, shape of notogaster, sharply tapering anterior margin of dorsosejugal suture, and the arrangement of prodorsal ridges.

***Bipassalozetes striatus* (MIHELČIČ)**

(Figs. 25, 26)

Passalozetes striatus MIHELČIČ, 1955, p. 199, fig. 3; 1957, p. 24; HIGGINS & WOOLLEY, 1962, p. 95, fig. 13; MIHELČIČ, 1967, p. 525; PÉREZ-IÑIGO, 1971, p. 343, figs. 80–82; 1993, p. 59, figs. 19F, G.

Passalozetes kaszabi MAHUNKA, 1964, p. 484, fig. 2.

Distribution in Mongolia: East Gobi Province, District Sainshand.

Key to the *Bipassalozetes*-species of Mongolia

1. Microsculpture of cerotegument consisting of fine lines, similar to pattern of human fingerprint; dorsosejugal suture continuous (not interrupted medially). Length 368 μm , width 194 μm (Figs. 17–20) *B. deserticus* sp. nov.
 –Microsculpture of cerotegument consisting of granules 2.
 –Microsculpture of cerotegument consisting of short, irregular ridges 4.
2. Granules of microsculpture polygonal or star-shaped, connected one another by lines of minute tubercles. Length 356–381 μm , width 186–211 μm (Figs. 1–4) *B. bidactylus* (COGGL, 1900).
 –Granules of microsculpture small and rounded. 3.
3. Granules of dorsal microsculpture very fine and weakly pigmented; a pair of prodorsal ridges present. Length 428–448 μm , width 232–244 μm (Figs. 9–12) *B. microsculpturatus* sp. nov.
 –Granules of dorsal microsculpture not so fine and dark-colored; prodorsal ridges absent. Length 327–348 μm , width 185–187 μm (Figs. 13–16) *B. mahunkai* sp. nov.
4. Sensilli glabrous, without barbation. Length 356–372 μm , width 170–186 μm (Figs. 5–8) *B. gobiensis* (MAHUNKA, 1964).
 –Sensilli sparsely barbed (with only two or three barbs). Length 307–340 μm , width 158–182 μm (Figs. 21–24) *B. mongolicus* sp. nov.
 –Sensilli finely barbed. Length 325–350 μm , width 150–160 μm (Figs. 25, 26) *B. striatus* (MIHELČIČ, 1955).

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